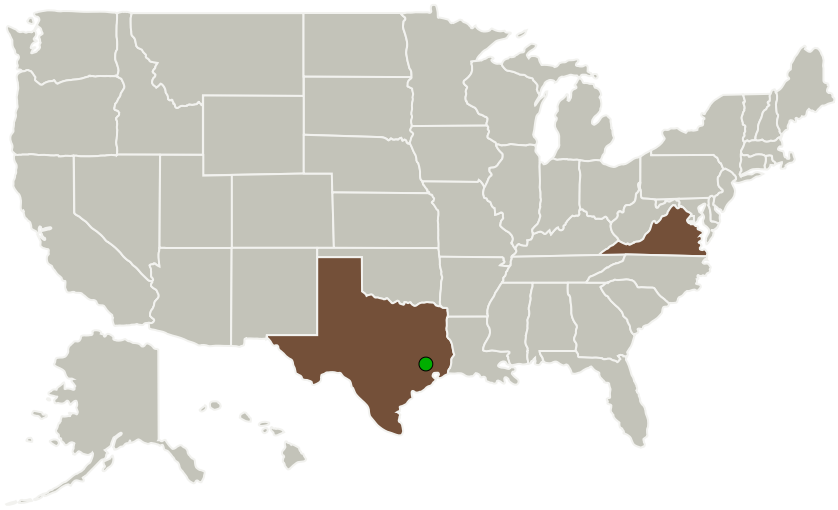
High Frequency Measurements in Shock-Wave/Turbulent Boundary-Layer Interaction at Duplicated Flight Conditions, Phase II

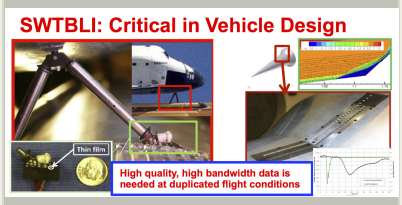
Completed Technology Project (2012 - 2015)

Project Introduction

Large amplitude, unsteady heating loads and steep flow gradients produced in regions of shock-wave/turbulent boundary-layer interaction (SWTBLI) pose a serious and challenging problem for designers of hypersonic vehicles. Characterizing SWTBLI flow features, such as the size of flow separation, is important for design evaluation and CFD validation. Tao Systems and CUBRC propose to develop a wide-bandwidth, thin-film heat transfer sensor system that quantifies the high frequency SWTBLI at duplicated flight conditions. This effort combines Tao Systems' high frequency-response/high-sensitivity electronics and signal processing techniques with the unique expertise of CUBRC in high-speed, high-enthalpy flows to obtain spatiotemporal information for the development of physics-based turbulence models.

Primary U.S. Work Locations and Key Partners





High Frequency Measurements in Shock-Wave/Turbulent Boundary-Layer Interaction at Duplicated Flight Conditions Project Image

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Organizations Performing Work	Role	Type	Location
Tao of Systems Integration, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hampton, Virginia
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

April 2012: Project Start

June 2015: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137395)*

Images

Project Image
High Frequency Measurements in Shock-Wave/Turbulent Boundary-Layer Interaction at Duplicated Flight Conditions Project Image *(https://techport.nasa.gov/image/133680)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Tao of Systems Integration, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Arun Mangalam

Co-Investigator:
Arun Mangalam

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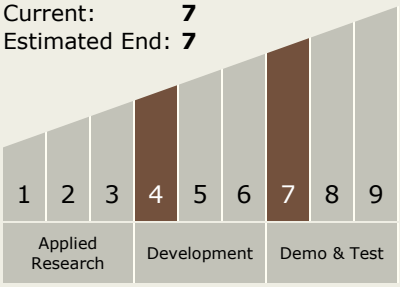
Completed Technology Project (2012 - 2015)

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.2 Heat Transport

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System